



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,986	08/20/2003	Peter H. McDonald	CS-21,295	4994

7590 04/11/2005

PRAXAIR, INC.
LAW DEPARTMENT - MI 557
39 Old Ridgebury Road
Danbury, CT 06810-5113

EXAMINER

VERSTEEG, STEVEN H

ART UNIT	PAPER NUMBER
----------	--------------

1753

DATE MAILED: 04/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/643,986

Applicant(s)

MCDONALD, PETER H.

Examiner

Steven H. VerSteeg

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1. The indicated allowability of claims 5 and 6 is withdrawn in view of the newly discovered reference(s) to Dunlop et al. Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 5 recites the limitation "the inert atmosphere" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 3, 4-8, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,030,514 to Dunlop et al. (Dunlop) in view of US 6,187,151 B1 to Leiphart and US 5,846,389 to Levine et al. (Levine).
7. For claim 1, Applicant requires a method of dry treating a target surface prior to using the target for sputtering comprising preparing a target assembly and securing the target assembly in a

Art Unit: 1753

vacuum chamber of a magnetron sputtering apparatus; energizing the magnetic component of the magnetron sputtering apparatus with a power between about 0.2 kW and about 4 kW for a period of time between about 4 and about 30 minutes to produce a surface dry treatment of a sputtering ion plasma on an exposed surface of the target to effectively reduce inherently undesirable impurities on the surface; removing the treated target assembly from the magnetron sputtering apparatus; and preparing the packaging the target assembly for subsequent use in a sputtering deposition process.

8. For claim 16, Applicant requires a magnetron sputtering apparatus comprising a vacuum chamber with a surface defining an opening adapted for securing a removable target assembly; support structure surrounding the opening of the vacuum chamber and spaced outside of the securing means for the removable target; a rotating magnet assembly secured to the support structure and disposed over the opening and adapted to be spaced apart from the removable target assembly; motor means for rotating the magnet assembly; and power means for energizing the magnet assembly.

9. Dunlop discloses pretreating a sputtering target assembly and then preparing and packaging the assembly for shipment to be subsequently used in a sputtering process (col. 5, l. 27-35). Dunlop does not disclose the specifics of the treatment method prior to packaging.

10. Leiphart discloses cleaning a sputtering target by placing the target in the chamber (Figure 1) and energizing the plasma to 500 watts (example) to clean the target in a plasma.

11. Levine discloses that when sputtering, it is beneficial to use a rotating magnetron behind a target in an apparatus that has an opening for removing and supplying the target so that the

Art Unit: 1753

plasma will be evenly distributed over the target surface to achieve uniform target erosion (Figure; col. 3, l. 25-33).

12. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Dunlop to utilize the pretreatment process taught by Leiphart because the pretreatment is the conventional pretreatment necessary before the sputtering target is utilized.

13. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Dunlop to utilize a magnetron behind the target because of the desire to achieve a uniform cleaning of the target surface.

14. The time period for cleaning the target surface would not require undue experimentation because one would simply run the process until the target is cleaned.

15. For claim 3, Applicant requires the time period to be 8-10 minutes and the power to be 0.2 kW to 0.4 kW. A power of 500 watts is about 0.4 kW and the time is obvious.

16. For claim 4, Applicant requires the target to be treated in an inert atmosphere. Leiphart burns-in in an inert atmosphere (Example).

17. For claim 5, Applicant requires the inert atmosphere to contain argon. Leiphart uses argon (col. 3, l. 24-25).

18. For claim 6, Applicant requires placing the target in an enclosure to protect it during storage. For claim 7, Applicant requires the enclosure to be a metallic enclosure and to further place it in another enclosure. Dunlop places the target in a metallic enclosure and then a plastic enclosure (col. 5, l. 26-35).

19. For claim 8, the target is titanium. Leiphart discloses a titanium target (Example).

Art Unit: 1753

20. Claims 2, 10-15, 17, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,030,514 to Dunlop et al. (Dunlop) in view of US 6,187,151 B1 to Leiphart and US 5,846,389 to Levine et al. (Levine) as applied to claim 1 above, and further in view of US 2003/0089601 A1 to Ding et al. (Ding).

21. For claims 2 and 17, Applicant requires the magnetron to be rotatable and the magnetic component to be disposed on less than a 180-degree arc measured at the axis of rotation of the apparatus so as to produce a rotatable sputtering ion plasma on the target. Dunlop in view of Leiphart and Levine discloses rotating the magnetron, but does not disclose the magnetron to be on less than 180 degrees.

22. Ding discloses a sputtering apparatus comprising a rotating magnetron system comprising a magnetron that comprises less than 180 degrees (Figure 1) with corresponding side magnets (Figure 1) that provides the benefit of smaller rotating magnetron is that the target power density can be maximized and results in uniform target erosion [0017].

23. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Dunlop in view of Leiphart and Levine to utilize a magnetron that is less than 180 degrees and rotates because of the desire to maximize the target power density and have uniform target erosion.

24. For claim 10, Applicant requires assembling the assembly into a sputtering apparatus to coat the substrate and then sputtering with the burn-in time reduced by 10%. It would have been obvious to assembly the target into an apparatus and use the target. Reducing the burn-in time by 10% would be inherent.

Art Unit: 1753

25. For claims 11 and 14, Applicant requires the time period to be 8-10 minutes and the power to be 0.2 kW to 0.4 kW. A power of 500 watts is about 0.4 kW and the time is obvious.
26. For claims 12 and 15, Applicant requires the target to comprise titanium. Leiphart discloses a titanium target (Example).
27. For claim 13, Applicant requires a treated target assembly made by the method of claim 2. Dunlop in view of Leiphart and Levine discloses a target.
28. For claim 19, Applicant requires the vacuum chamber to comprise a bottom support plate, an upper support plate defining the opening and viton vacuum seal side enclosure. For claim 20, Applicant requires a removable target assembly secured into the opening of the upper support plate. Dunlop in view of Leiphart and Levine discloses the limitation.
29. Claims 9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,030,514 to Dunlop et al. (Dunlop) in view of US 6,187,151 B1 to Leiphart and US 5,846,389 to Levine et al. (Levine) as applied to claims 2 and 17 above, and further in view of US 6,187,457 B1 to Arai et al. (Arai).
30. For claims 9 and 18, Applicant requires the magnet component to be FeNdB. Dunlop in view of Leiphart and Levine does not disclose the magnet component.
31. Arai discloses that using a FeNdB magnet component in a magnetron is common in the art and therefore obvious (col. 6, l. 50-57).

Response to Amendment

32. The objection to the drawings presented in the office action mailed November 26, 2004 is withdrawn.

Art Unit: 1753

33. All prior art rejections presented in the office action mailed November 26, 2004 are withdrawn in light of the amendment to claim 1.

34. The claim objections presented in the office action mailed November 26, 2004 are withdrawn in light of the amendment.

35. The 112-second paragraph rejections presented in the office action mailed November 26, 2004 are withdrawn in light of the amendment, but a new rejection is presented above.

Response to Arguments

36. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

37. Applicant has argued that Leiphart does not disclose or suggest preparing the target via dry treatment prior to its use in a sputtering deposition process. I disagree. Leiphart does in fact prepare the target before use, the difference between Applicant's claimed invention and Leiphart is that Leiphart doesn't remove the target and then prepare and package it for subsequent use. Leiphart uses the target immediately after treatment, within the same apparatus.

General Information

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.

For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

Art Unit: 1753

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven H VerSteeg
Primary Examiner
Art Unit 1753

shv
April 7, 2005